



WOOD ENERGY

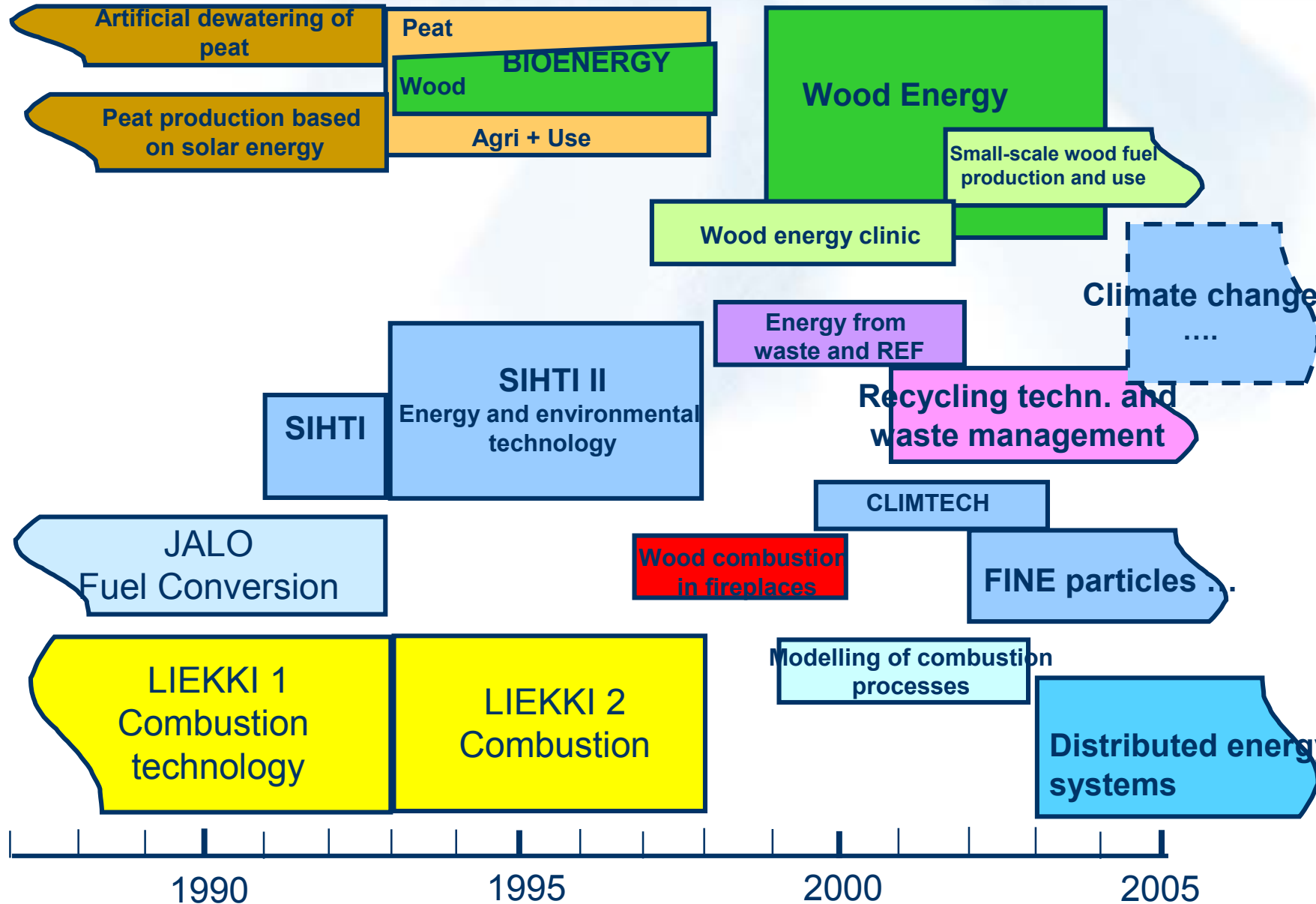
Wood Energy Technology Programme

R&D on the wood fuel production chains.



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Tekes' programmes on Bioenergy





WOOD ENERGY

Wood Energy Technology Programme

The programme develops production chains of wood fuel, primarily forest chips, and related technologies.

- Programme duration: 1999-2003
- Programme volume: approx. 42 million euros,
 - of which Tekes funding is 13 million euros
 - Ministry of Trade and Industry funds demonstration projects with 4 million euros
- Programme Manager: Professor Pentti Hakkila, VTT Processes
- Further information:
www.tekes.fi/english/programmes/woodenergy



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Operational Environment of the Programme

During the start-up of the programme the following factors have limited the utilisation of forest chips

- **The high cost level of forest chips**
- **The unhomogeneous wood fuel quality and the difficulty in predicting quality variations**
- **Inadequate employment of production machines**
- **Uneven seasonal distribution of utilisation**
- **Unprepared forestry organisations**
- **Lack of experienced forest machine entrepreneurs**





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Experts in all sections of the production chain participate

Parties involved in the programme

- Over 80 companies: machine manufacturers, energy utilities, fuel producers
- Machine entrepreneurs
- Experts on wood procurement and energy production in the forest industry
- Leading research institutes of the forestry science and energy technology
- Various associations

Company-driven executive committee with representatives from major market actors in the forest fuel area

- Companies: machine manufacturers, energy companies, fuel producers, forest industry and associations
- Tekes (National Technology Agency), VTT (Technical Research Centre of Finland), Ministry of Trade and Industry, Ministry of Agriculture and Forestry



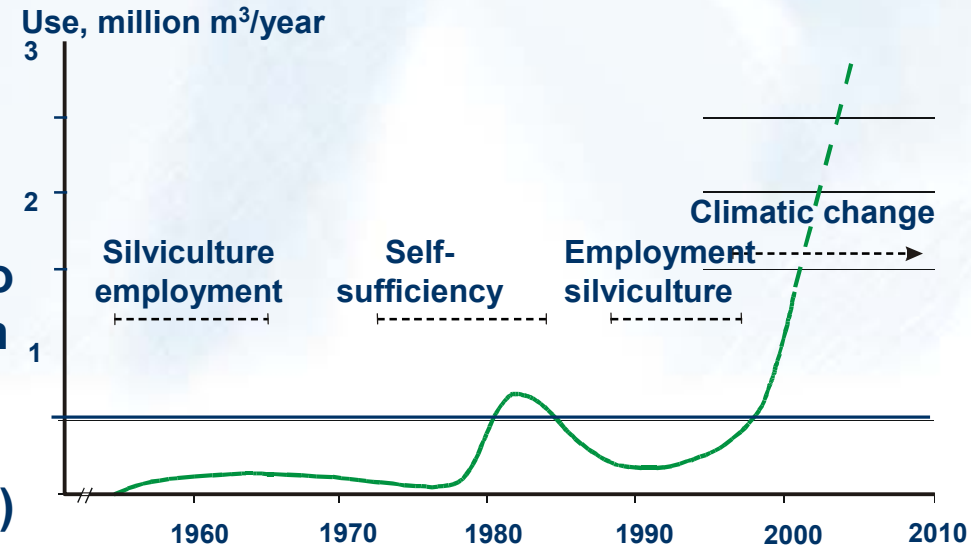
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Objectives

Development of large-scale production chains and technologies for forest chips

- The concrete objective is to increase annual production from the level of 0.5 million m³ solid (1 TWh) in 1998 to 2.5 million m³ solid (5 TWh) by the year 2003
- This objective requires development of production technology in order to reduce costs, ensure secure supply and improve the quality of forest chips
- The programme supports the achievement of the objectives of the National Climate Change Strategy through technological solutions





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Focus Areas 1 (2)

- Integration of the production of fuel and round wood
- Production planning and development of logistics
- Development of production systems, including comminution, handling and storage at the plant
- Development of long distance transportation and receiving of forest chips and loose residues



Photo: Biowatti



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Focus Areas 2 (2)

- To promote the participation of forest machine and truck contractors in large-scale forest chip production
- To promote the quality control of forest chips in order to improve the calorific value of chips and the operational reliability of wood-fired plants
- To improve the handling and production properties of bark, sawdust and other solid wood residues



Photo: VTT



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Programme Results

- 5 production chains have been demonstrated in practice
- Although the production costs of forest chips fell in the 1990s, high cost still remains an obstacle to increased use
- Possibilities for further cost reduction are almost non-existent, as demand multiplies and transport distances grow
- The price competitiveness of chips is, however, much better today than in the 1990s (average price 10 euros/MWh in 2002)
- The use of logging residue chips has more than tripled since 1998 and was 1.7 million m³ solid (3.4 TWh) in 2002
- Research capacity for this area has increased and the networking of research institutes has progressed



Photo: Timberjack





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Drivers Behind the Development

- **Abundant resources. Annual wood consumption 15 m³/capita (in EU 0.7)**
- **Long traditions in the use of wood fuels for CHP production and district heating**
- **Government's international commitments, goals (5 million m³ solid of forest chips in 2010) and effective support measures**
- **Strong R&D component**
- **Strong relevant machine manufacturing industries (timber harvesting, fluidized bed combustion, etc)**
- **Positive attitude and active role of the forest industries**
- **Large number of experienced independent entrepreneurs in timber harvesting**
- **Co-firing of wood and peat, helping to overcome temporary problems in the quality and availability of fuel chips**

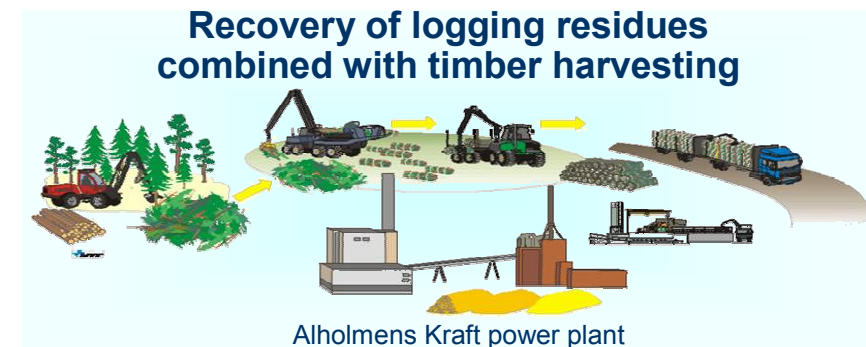


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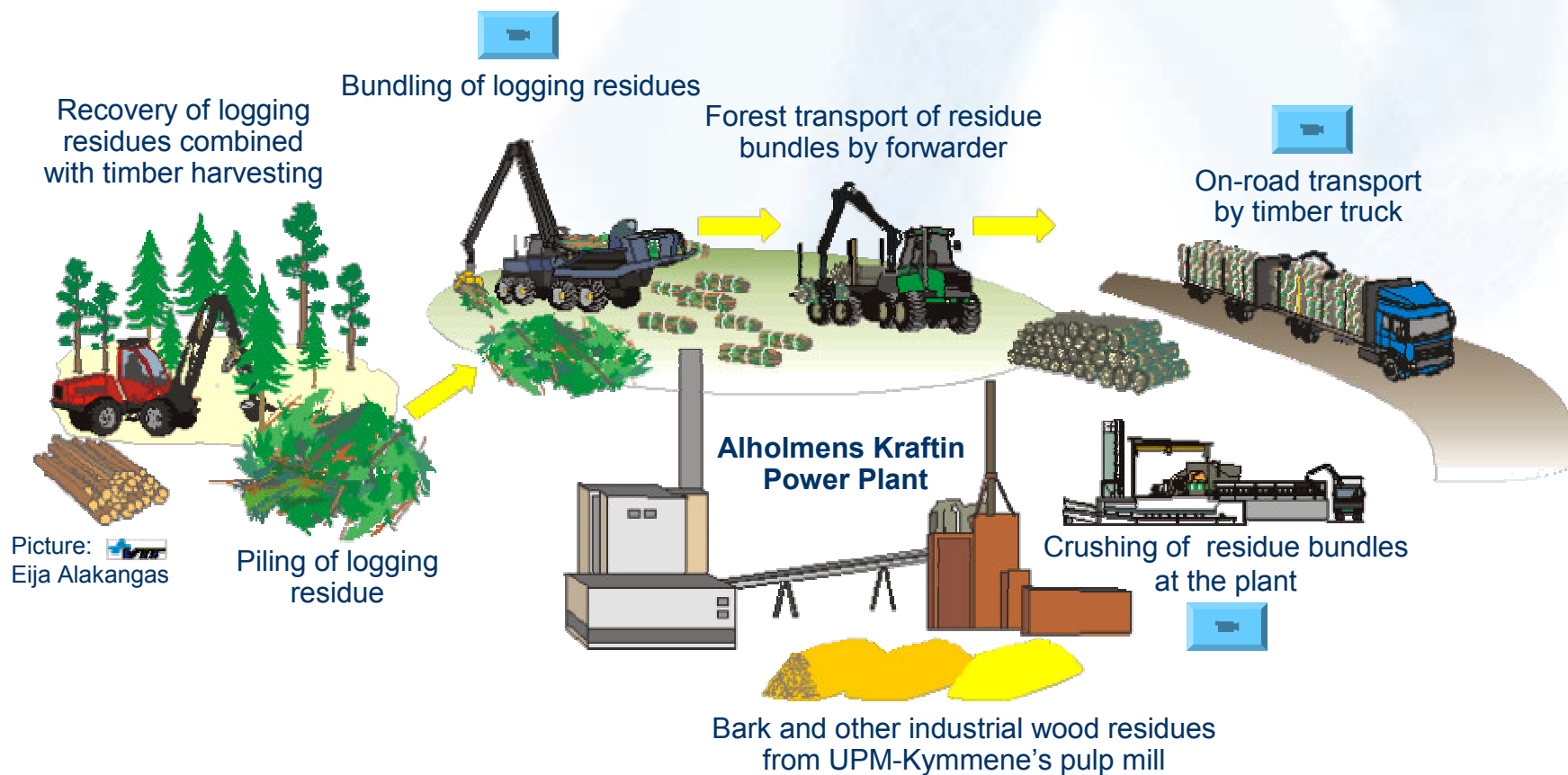


Project cluster 1: Bundling of logging residues for Alholmens Kraft power plant

- UPM-Kymmene, PVO, Timberjack and research institutes have jointly developed a ground-breaking procurement system for forest fuel based on bundling of logging residues at the site and crushing at the power plant
- Several of the projects included in this programme have participated in the development and introduction of bio fuel procurement to the Alholmens Kraft power plant in 2001
- Among the topics studied in these projects are fuel supply technologies and chains, receiving, storage and combustion technology
- This research has been granted EU research financing



Production chain of bundling logging residues for the Alholmens Kraft power plant





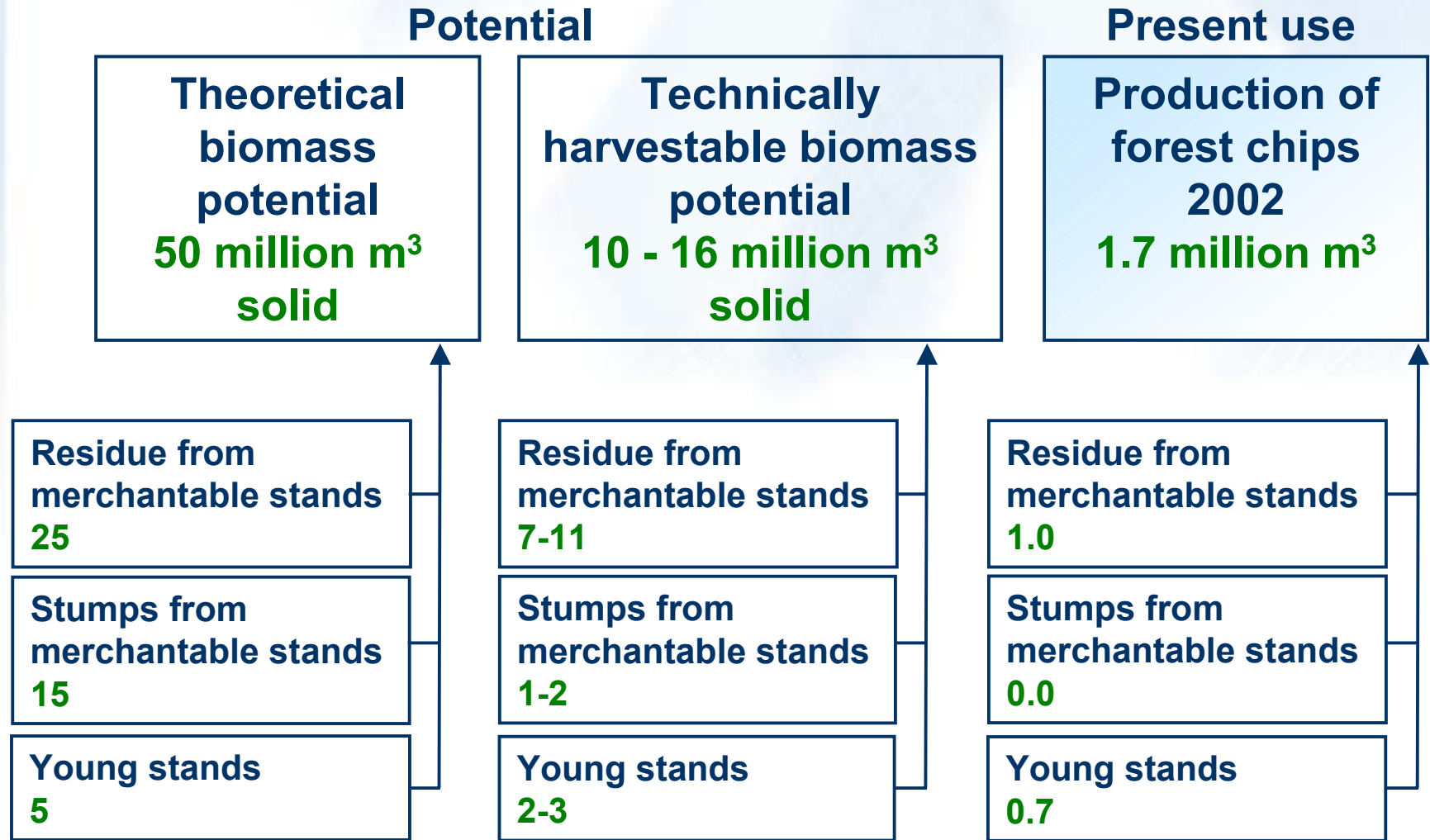
Project cluster 2: Cost factors of forest fuel production

- **The cost factors of forest chip production are of great importance in view of system development. The subject has been studied in the following projects particularly:**
 - **Cost factors and the logistics of large-scale procurement production of logging residue chips**
 - **Logistics of lorry transport of chips**
 - **Development of forest chip production from young stands**
- **Results are applied to the planning of forest chip production, selection of stands, evaluation of wood fuel supply and the development of machines and systems**
- **Long-distance transport amounts to one-third of the production costs of forest chips and to almost half of the costs if loose residues are transported**
- **A GPS navigation system based on mobile phones has been studied for steering chip lorries and the use of digital map material in forest transportation has been investigated**





Availability of Forest Chips (million m³ solid)





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Targeted areas of small-scale production and use of wood fuel in 2002-2004

In 2002 it was decided to extend the programme to include small-scale production and use of wood fuels.

Targeted areas

1. Small-scale production and handling of wood fuels
2. Pellet production, distribution and use
3. Heating technology
4. Business and service concepts



Photos:
Vapo and
Tulikivi



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Projects

September, 2003

	Research projects	Industrial projects
Planning, organization	5	3
Techniques, procurement systems	7	17
Quality control, handling and use	14	8
Impacts on forestry	6	1
Small-scale production and use	3	6
International cooperation	6	1
Total	41	36
Demonstration projects		29
Exco funded surveys	13	
Grand total	54	65



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Exco projects are projects funded by the Executive Committee of the Programme

Bundler-Forwarder



Road transportation



Crushing

